

WHAT IS CLAIMED IS:

1. A cell-free method of producing glucosamine-6-phosphate from starch, maltodextrin or glycogen comprising incubating starch, maltodextrin or glycogen with glutamine in a reaction mix comprising a cellular extract comprising glucosamine-6-phosphate synthase activity.
2. The method of claim 1, wherein said cellular extract comprises glucosamine-6-phosphate synthase.
3. The method of claim 1, wherein said extract is a eukaryotic cell or bacterial cell extract.
4. The method of claim 3, wherein said cellular extract is an *E. coli* extract.
5. The method of claim 1, wherein said cellular extract is prepared by disrupting the cells, removing cellular debris and performing an ammonium sulfate precipitation and collecting the precipitate produced between 40% and 60% ammonium sulfate saturation.
6. The method of claim 1, wherein said starch is selected from the group consisting of soluble starch, corn starch, potato starch, rice starch and wheat starch.
7. The method of claim 1, wherein said glycogen is selected from the group consisting of rabbit liver glycogen, bovine liver glycogen, mussel glycogen and oyster glycogen.
8. The method of claim 1, wherein said maltodextrin is maltodextrin 10.

9. The method of claim 1, wherein said reaction mix further comprises one or more of a phosphorylase, phosphoglucomutase, glucose-1,6-bisphosphate and phosphoglucose isomerase.
10. The method of claim 1, wherein said reaction mix comprises:
 - a phosphate source;
 - soluble starch;
 - KCl;
 - glutamine;
 - a magnesium source;
 - glucose-1,6-bisphosphate;
 - a phosphorylase;
 - phosphoglucomutase;
 - phosphoglucose isomerase; and
 - E. coli* extract.
11. A cell-free method of producing glucosamine-6-phosphate from starch, maltodextrin or glycogen comprising incubating starch, maltodextrin or glycogen with an ammonium source in a reaction mix comprising a cellular extract comprising glucosamine-6-phosphate deaminase activity.
12. The method of claim 11, wherein said cellular extract comprises glucosamine-6-phosphate deaminase.
13. The method of claim 11, wherein said extract is a eukaryotic cell or bacterial cell extract.
14. The method of claim 13, wherein said cellular extract is an *E. coli* extract.

15. The method of claim 11, wherein said cellular extract is prepared by disrupting the cells, removing cellular debris and performing an ammonium sulfate precipitation and collecting the precipitate produced between 30% and 50% ammonium sulfate saturation.
16. The method of claim 11, wherein said starch is selected from the group consisting of soluble starch, corn starch, potato starch, rice starch and wheat starch.
17. The method of claim 11, wherein said glycogen is selected from the group consisting of rabbit liver glycogen, bovine liver glycogen, mussel glycogen and oyster glycogen.
18. The method of claim 11, wherein said maltodextrin is maltodextrin 10.
19. The method of claim 11, wherein said reaction mix further comprises one or more of a phosphorylase, phosphoglucomutase, glucose-1,6-bisphosphate and phosphoglucose isomerase.
20. The method of claim 11, wherein said reaction mix comprises:
 - a phosphate source;
 - soluble starch;
 - KCl;
 - an ammonium source;
 - a magnesium source;
 - glucose-1,6-bisphosphate;
 - a phosphorylase;
 - phosphoglucomutase;
 - phosphoglucose isomerase; and
 - E. coli* extract.

21. A cell-free method of producing glucosamine comprising incubating glucosamine-6-phosphate with a phosphatase in a reaction mix.
22. The method of claim 21, wherein said phosphatase is selected from the group consisting of shrimp alkaline phosphatase, bovine intestinal alkaline phosphatase and bacterial alkaline phosphatase.
23. A cell-free method of producing glucosamine from fructose comprising incubating fructose with glutamine in a reaction mix comprising a cellular extract comprising glucosamine-6-phosphate synthase activity.
24. The method of claim 23, wherein said cellular extract comprises glucosamine-6-phosphate synthase.
25. The method of claim 23, wherein said extract is a eukaryotic cell or bacterial cell extract.
26. The method of claim 23, wherein said cellular extract is an *E. coli* extract.
27. The method of claim 26, wherein said cellular extract is prepared by disrupting the cells, removing cellular debris and performing an ammonium sulfate precipitation and collecting the precipitate produced between 40% and 60% ammonium sulfate saturation.
28. The method of claim 23, wherein said reaction mix comprises:
 - fructose;
 - KCl;
 - glutamine; and
 - E. coli* extract.

29. A cell-free method of producing glucosamine from fructose comprising incubating fructose with an ammonium source in a reaction mix comprising a cellular extract comprising glucosamine-6-phosphate deaminase activity.
30. The method of claim 29, wherein said cellular extract comprises glucosamine-6-phosphate deaminase.
31. The method of claim 29, wherein said extract is a eukaryotic cell or bacterial cell extract.
32. The method of claim 31, wherein said cellular extract is an *E. coli* extract.
33. The method of claim 29, wherein said cellular extract is prepared by disrupting the cells, removing cellular debris and performing an ammonium sulfate precipitation and collecting the precipitate produced between 30% and 50% ammonium sulfate saturation.
34. The method of claim 29, wherein said reaction mix comprises:
 - fructose;
 - KCl;
 - an ammonium source; and
 - E. coli* extract.